University of Hawaii at Manoa

Hawaii Natural Energy Institute
Holmes Hall 246 • 2540 Dole Street • Honolulu, Hawaii 96822

April 23, 1990

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Duane:

As required in the County of Hawaii Planning Commission's geothermal resources permit (GRP 89-1), we have enclosed five (5) copies each of the March monthly report and January quarterly report.

If you have any questions, please call me at 522-5611, or in my absence, Arthur Seki, at 948-8788.

Sincerely yours,

Harry Olson
Hawaiian Electric Industries/
Spark Matsunaga Fellow in
Geothermal Energy Research

Enclosures: March monthly report
January quarterly report

cc: A. Seki

MARCH 1990 MONTHLY REPORT

Scientific Observation Hole (SOH) Program

Geothermal Resource Permit: GRP 89-1

Lilewa, Kapoho, and Halekamahina, Hawaii

TMK: 1-2-10:01; 1-4-01:02; and 1-4-02:32

Hawaii Natural Energy Institute

University of Hawaii

April 1990

SUMMARY

This document presents a monthly report to the County of Hawaii Planning Department to support the scientific observation hole (SOHs) program in the Kilauea middle and lower east rift zone. The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. The information to be gained from the SOHs will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

This report addresses: occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility; performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed; and emission measurements.

I. INTRODUCTION

The County of Hawaii Planning Commission approved, on August 8, 1989, a geothermal resource permit application (GRP 89-1) to drill scientific observation holes (SOHs) in the Kilauea middle and lower east rift zone. This document presents a monthly report, as required in condition 6:

> "The petitioner shall maintain a record in a permanent form suitable for inspection and five (5) copies shall be filed with the Planning Department on a monthly basis during drilling and for six (6) months after the completion of drilling to establish a hole specific baseline and such record shall be available to the community. The record shall include:
>
> a. Occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility.
>
> b. Performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed.
>
> c. Emission measurements reported in units compatible with applicable standards/guidelines."

II. BACKGROUND

The SOHs are for scientific observation purposes only. The holes <u>will not be flow-tested or produced</u>. A designated four holes are planned on the Big Island of Hawaii. Three of the Big Island holes (SOHs 1, 2, and 4) are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH 3, is on conservation land. SOH

activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell has been approved.

III. SOH 4 SITE

Drilling Activity

Tonto Drilling Services continued drilling work at SOH 4. The third casing (6.625 inches) was installed and cemented to 2,000 feet. Coring continued to a depth of 3,462 feet.

Monitoring Program - Air Quality

A monitoring station is setup to measure air quality. These instruments will provide a continuous record of atmospheric H_2S concentrations when interfaced with a data logger or chart recorder. The unit is located in a utility van on-site and power is provided by the drill rig system.

Some moisture problems occurred earlier in the month, but was resolved with the addition of a moisture-trap at the humidifier. The photo-cells will have to be replaced next month. Data capture was 100 percent (see Appendix for data and maintenance report).

Monitoring Program - Meteorological

Continuous wind speed and direction measurements were made in February with a recording wind speed/direction sensor system. A data logger and back-up pressure-sensitive recorder is being used to record the wind speed and direction data. The unit is located in a utility van on-site and power is provided by the drill rig system.

The station operated normally throughout the month. Data capture was 100 percent (see Appendix for data and maintenance report).

Monitoring Program - Noise

Ambient noise measurements were made at Laughlin residence near the SOH 1 site. Moisture problems with the microphone was resolved by placing condom around the instrument. Frequent chart paper jamming was resolved by temporarily replacing the problem unit. The defective unit was sent back to manufacturer and later returned for operation at the Laughlin residence.

A noise monitoring station was located at the SOH 4 site during drilling. Operation was normal at the SOH 4 site.

Emissions Reports

H_2S monitors showed very low emissions (see Appendix for maintenance report). Average H_2S concentration at SOH 4 is about 1 ppb, while similar stations around HGP-A averaged about 2 ppb.

IV. SOH 1 SITE

No drilling activity has been initiated. Ambient noise monitoring has been made around the SOH 1 site at Laughlin residence. Grading/grubbing permit has been submitted to County of Hawaii Public Works. Findings of the flora/fauna field surveys along with metes and bounds have been sent to County of Hawaii Planning Department.

V. SOH 3 SITE

No drilling activity has been initiated. Access to the SOH 3 site has not been constructed, nor has the site been cleared or graded.

VI. SOH 2 SITE

No drilling activity has been initiated. Ambient noise monitoring being prepared for SOH 2 site. Findings of the flora/fauna field surveys have been sent to County of Hawaii Planning Department. Permit application was submitted to Department of Land and Natural Resources to inspect, modify, and if practical, install a pump into existing airstrip well to supply water for drilling operations.

APPENDIX

MAINTENANCE REPORT

ALPHA MICROSYSTEMS

1550 Akolea Place
Hilo, Hawaii 96720
(808) 935-7985

HAWAII NATURAL ENERGY INSTITUTE
2540 Dole Street
Honolulu, HI 96822

Attn Arthur S. Seki

March 7, 1990

Dear Art,

This report covers the period Mar. 1, to Mar. 31, 1990.

FENCELINE HAI. There was a power outage at HGP-A which caused the loss of 52 hours data between March 4 & 6. An additional loss of 48 hours between March 12 & 14 was due to my leaving the instrument in a check rather than in a run mode. Other than the two periods of data loss, the instrument functioned normally. Calibrations were routine and consistant. There has be a considerable drop in H2S readings since December. Data capture was 87%.

GILMAN HAI. This instrument operated normally throughout the month. Only minor calibration adjustments were required and the Analyzer was very stable. There were three minor power outages between March 1 & 5 which did cause the loss of 9 hours data. H2S readings have dropped at this station also. Data capture for March was 99%.

SOH-4 DRILL SITE. There were some moisture problems at this instrument during the early part of the month that were resolved with the addition of a moisture-trap at the humidifier. The H2S readings have become somewhat unstable at the end of the month, but still within limits. Will have to replace the photo-cells next month. Calibrations were routine, Data capture was 100%.

WOODS HAI. Other than a four hour power outage on March 4, there were no problems with this instrument. There were only minor calibration adjustments required during the month and data capture was 99%.

WOODS MET. This station operated normally until March 21. On that day, the station became intermittant. The data loss was somewhat greater each day, but was so ambiguous that I was not able to isolate the problem until the 29th when final repairs were effected. Due to this problem, total data capture at this station was only 86%. 101 hours of data was lost.

T.P. MET. All parameters at this station operated problem free during the entire month. Calibrations were routine and data capture was 100%.

SOH-4 MET. This station also operated normally throughout March. Calibrations were routine...Data capture was 100%.

SOH-4 COLORTEK. These cards were routinely replaced and did not give any indications of color change.

Enclosed:

H2S Data Reduction for Fenceline, Gilman, SOH-4 and Woods for March 1990.
Average, Maximum and total H2S for the above stations.

Meteorological Data Reduction for Woods, T.P., and SOH-4. March 1990.

Synopsis of Woods and T.P. Met Data for March, 1990.

Copy of Station Logs, March, 1990.

March Invoice

Supplementary Billing

		Hours	Material
J-061	Friday 3-2-90 LAUGHLIN. Moisture problems with microphone, not much data. Repaired, calibrated. SOH-4 SOUND. Operating normally - calibrated. COLORTEK. No color changes..Replaced cards.	2.00	
J-064	Monday 3-5-90 LOUGHLIN. Chart jammed. Replaced wind screen. SOH-4 SOUND. Operating normally.	1.25	
J-066	Wednesday 3-7-90 LOUGHLIN. Removed chart recorder for repair, and installed personal recorder temporarily. SOH-4 SOUND. Operating normally.	1.50	
J-067	Thursday 3-8-90 Dismantled chart recorder. Found pen drive spindle to be very rusty. Cleaned and replaced but this would have no effect of Drive jamming. Chart drive motor normal, but I believe that the drive belt was set too tight causing the reduction gears to bind. Adjusted belt and put recorder on test bench running at 2 cm/hr to see if it will jam. Should know in a few days.	3.00	
J-068	Friday, 3-9-90 LOUGHLIN. Operating normally. Calibrated sound meter and recorder. Installed condom on mike. SOH-4 NOISE. Operating normally. Calibrated sound meter and recorder, installed condom on microphone.. COLORTEK. Replaced all cards..No color change.	1.50	
J-070	Sunday, 3-11-90 Chart recorder drive now operating properly, no jams. However, Span-amplifier seems to have failed last night...No output on the volts range, but milivolts range O.K. Will discuss with Darby.	1.00	
J-071	Monday, 3-12-90 LOUGHLIN. Pen dry, lost some data SOH-4 NOISE. Some data loss due to power cable being disconnected. Also, someone had changed the range switch on the noise meter..probably Sunday.	2.50	
J-073	Wednesday, 3-14-90 Both stations operating normally. No problems.	1.00	
J-074	Thursday, 3-15-90 Packed and shipped Loughlin's chart recorder to Esterline-Angus in Houston via UPS.	3.00	34.75
J-075	Friday, 3-16-90 Both stations operating normally. Calibrated the instruments and replaced charts to forward to Ron Darby. Replaced Colortek cards. No H2S trace.	2.00	

J-078 Monday, 3-19-90 1.00
Both Noise level stations normal. No adjustments.

J-080 Wednesday, 3-21-90 1.00
Pen ran dry at Loughlin's, some data lost there.
Stations operating normally otherwise.

J-082 Friday, 3-23-90 2.00
Both stations operating normally. Calibrations
were routine. Replaced Colortek cards. Normal.

J-085 Monday, 3-26-90 1.50
Replaced repaired chart recorder at Loughlin.
Calibrated and tested O.K. Both stations were
operating normally

J-087 Wednesday, 3-28-90 1.00
SOH-4 operating normally. Had left chart recorder
at Loughlin's in battery mode so battery died
after a few hours and lost data there. Checked
operation..Normal

J-089 Friday, 3-30-90 2.00
Both stations operating normally. Calibrations
were routine. Replaced charts. Replaced Colortek
cards. No color change.

NAME EXPERIMENT NO

J-061 Friday 3-2-90

Woods HAI Range ∅ to 3ppb

Flow steady @ 2.5, Renewed Chamb., Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 25.0%, down .4%

Optics steady @ 1440-1440

Range- High 1ppb High, adj: Fan L:L Low L:L

Zero Calib 22 6 4 2 (Zero Air) ∅

Span Calib - Exp 50 50 50 50 50

Act 28 40 44 44 50

SOH-4 Met - Operating Normally - Renewed Chamb

Woods-Met

Operating Normally - Renewed Chamb

IP Met

Operating Normally - Retained Chamb - Batt OK @ 11.9V

Fenceline HAI Range ∅ to 3ppb

Flow steady @ 4.0, Renewed Chamb - Lead Acetate O.K.

Tygon Dry - Pump + Bubbler O.K

Check Steady @ 21.7%

Optics 1610-1600, down 10 ea, No adj:

Range - High L:L Low 1ppb High, adj: Fan L:L

Zero Calib 90 9 3 -2 (Zero Air) ∅

Gilman HAI Range ∅ to 3ppb

Flow Steady @ 3.0, Renewed Chamb, Lead Acetate O.K.

Tygon Dry - Pump + Bubbler OK

Check 24.7%, down .1%

Optics 1930-1900, down 30 ea, adj: to 1900-1900

Range: High 1ppb High - adj: Fan L:L Low L:L

Zero Calib 34 16 3 1 ∅

SON-4: Range ∅ To 2ppb

Flow steady @ 2.0, Renewed Chamb, Lead Acetate O.K.

Drained Tygon (some moisture problems) - will install Trap.

Check 10.0%, up .1%

Optics 2010-2000, down 10 ea, No adj:

Range - High L:L Low L:L

Zero Calib 12 6 2 1 ∅

NAME EXPERIMENT NO.

J-064 Monday 3-5-90

Woods HAI Range ϕ to 4ppb
Flow Steady @ 2.5, Chart & Lead Acetate O.K
Tygon Dry - Filled Bubbler - Pump O.K
Check 25.2%, up .2%
Optics 1450-1430, down 20-2, adj. to 1430-1430
Zero Calib 24 5 1 ϕ

Woods Met
Operating Normally - Chart O.K - Calib Check on front Panel O.K
T.P. Met
Operating Normally - Replaced Chart - Replaced Battery
SOH-4 Met
Operating Normally - Chart & Calib O.K.

Excelsior HAI
* No Power at This Station - Not on Area-wide outage
Unable to check operation or to Calibrate.

Gilman HAI Range ϕ to 2ppb
Flow adj. to 3.0 Chart O.K. Replaced lead Acetate
Tygon Dry - Pump & Bubbler O.K
Check Steady @ 24.7%
Optics Steady @ 1890-1890
Zero Calibration 23 8 2 ϕ ϕ
* Note — There have been several minor power outages

SOH-4 HAI Range ϕ to 2ppb
Replaced Defective Flowmeter
Flow set @ 2.5, Chart and lead Acetate O.K
Drained Tygon and Bubbler - Pump O.K
Check 14.8%, down .2%
Optics 1980-2000, up 20-2, adj. to 2000-2000
Zero Calib 13 5 3 ϕ 1 ϕ

NAME EXPERIMENT NO.

J-066 Wednesday 3-7-90

Woods HAI Range ø to 2ppb
Flow steady @ 2.5, chart + lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check steady @ 25.2%
Optics 1440-1450, up 10 ea, adj To 1450-1450
Zero Calib 22 8 + 1 ø

Woods Met
Operating Normally - chart OK
I.C. Met
Operating Normally - chart + Batt OK
SOH-4 Met
Operating Normally - chart OK

Fenedine HAI Range ø To 3ppb
Flow Steady @ 4.0, chart + Lead Acetate OK
Tygon Dry - Filled Bubbler - Pump OK
Check 21.5%, down .2%
Optics 1600-1590, down 10 ea, No adj
Zero Calib 23 8 4 1 ø

Gilman HAI Range ø To 2ppb
Flow Steady @ 3.0, chart + lead Acetate OK
Tygon Dry - filled Bubbler - Pump OK
Check 25.3%, up 1.4%
Optics 1890-1900, up 10 ea, adj To 1900-1900
Range - High LL Low LL
Zero Calib 24 11 2 ø
Span Calib - Exp 50 50 50 50 50
Act 35 46 50 51 50

SOH-4 ~~Met~~ HAI Range ø to 2ppb
Flow adj To 2.5, chart + lead Acetate OK
Tygon Dry - Filled Bubbler - Pump OK
Check 15.1%, up .3%
Optics 2010-2040, up 30 ea, adj To 2040-2040
Range: High LL Low LL
Zero Calib 5 13 2 ø ø

NAME EXPERIMENT NO.

J-068 Friday 3-9-90

Woods HAI Range ϕ to 2ppb
Flow Steady @ 2.5, Replaced Chart, Lead Acetate O.K
Typon Dry - Pump + Bubbler O.K
Check Steady @ 25.2%
Optics steady @ 1440-1440
Zero Calib 23 7 3 ϕ ϕ

Woods Met
Operating Normally - Renewed chart
T.P. Met
operating Normally - Chart + Batt O.K.
SOH-4 Met
operating Normally - Renewed Chart - Zero Span Normal

Fenceline HAI Range ϕ to 2ppb
Flow steady @ 4.0, Renewed chart, lead Acetate O.K
Typon Dry - Pump + Bubbler O.K
Check Steady @ 21.5%
Optics steady @ 1610-1610
Zero Calib 24 4 1 1 ϕ

Bilman HAI Range ϕ to 2ppb
Flow Steady @ 3.0, Renewed chart, Lead Acetate O.K
Drained Typon - Filled Bubbler - Pump O.K
Check Steady @ 25.3%
Optics 1910-1920, up 10 ea, adj To 1920-1920
Zero Calib 24 ϕ 2 1 ϕ

SOH-4 HAI Range ϕ to 2ppb
Flow adj To 2.0, Renewed Chart, Lead Acetate O.K
Drained Typon - Filled Bubbler - Pump O.K
Check 15.2%, up 1%
Optics 2150-2180, up 30 ea, adj to 2180-2180 (getting unstable
Zero Calib 15 ϕ 2 2
Span Calib - Exp 50 50 50 50 } No adj Necessary
Act 33 41 48 50

SOH-4 Colortek
Replaced all Cards - No Color change noted

NAME EXPERIMENT NO.

J-071 Monday 3-12-90

Woods HAI Range 0 to 2ppb
Flow steady @ 2.5, chart OK, Replaced Lead Acetate
Drained Tygon - Pump & Bubbler OK
Check 20.4%, up .2%
Optics 1430-1440, up 10 ea, adj to 1440-1440
Range - High Li Low Li
Zero Calib 23 3 1 -0 (Zero Pot Tweak Right) 0
Span Calib - Exp 50 50 50 50
Act 22 36 47 50

Woods Met
Operating Normally - Replaced Chart - Rebalanced Roll Gage
T.P Met
Operating Normally - Renewed Chart - Batt OK @ 12.24
SOH-4 Met
operating Normally - Chart OK

Fenceline HAI Range 0 to 2ppb
Flow Steady @ 4.0, chart + lead Acetate OK
Drained Tygon - Pump & Bubbler OK
Check Steady @ 21.5% - Range Pot to 918 from 910
Optics 1600-1670, up 20 ea, adj to 1620-1620
Zero Calib 89 8 4 2 (Zero Pot Tweak Left) 0

Gilman HAI Range 0 to 2ppb
Flow Steady @ 3.0, chart + Lead Acetate OK
Tygon Dry - Pump & Bubbler O.K.
Check Steady @ 26.8%
Optics 1910-1970, up 10 ea, adj to 1920-1920
Zero Calib 23 2 1 0

SOH-4 HAI Range 0 to 2ppb
Flow adj to 2.5, chart OK, Replaced Lead Acetate
Tygon Dry - Filled Bubbler - Pump OK
Check 15.3%, up .1%
Optics 2140-2120, down 20 ea, adj to 2120-2120
Zero Calib 10 8 0 1 0

NAME EXPERIMENT NO.

J-073 Wednesday 3-14-90

Woods HAI Range ø to 3 ppb
Flow steady @ 2.5, chart + lead Acetate OK
Drained Tygon - Pump + Bubbler OK
Check 25.3%, down .1%
Optics 1450-1440, down 10 ~, No adj:
Zero Calib 22 5 1 ø

Woods Met
Operating Normally - Chart OK, Front Panel Calib Normal
I.P. Met
Operating Normally - Chart + Batt OK - Front Panel Calib Normal
SOH-4 Met
Operating Normally - Chart OK - Front Panel Calib Normal

Fenceline HAI No Data 48 HOURS
Flow steady @ 4.0, chart OK, Replaced lead Acetate
Tygon Dry - Pump + Bubbler OK
Check steady @ 21.5%
Optics 1620-1610, down 10 ~, ~~adj~~ No adj:
Range - High 1:1 Low 1:1
Zero Calib 23 6 2 ø ø
Span Calib - Exp 50 50 50 50 60
Act 21 38 47 49 50

Gilman HAI Range ø to 3 ppb
Flow steady @ 3.0, chart + lead Acetate OK
Drained Tygon - Pump + Bubbler OK
Check 25.1%, down .2%
Optics 1940-1910, down 30 ~, adj to 1920-1920
Range - High 1:1 Low 1:1
Zero Calib 22 8 3 ø ø

SOH-4 HAI Range ø-2
Flow adj to 2.5, chart + lead Acetate OK
Tygon Dry - Pump + Bubbler OK
~~Ch~~ Check steady @ 15.3%
Optics 2130-2160, up 30 ~, adj to 2160-2160
Range - High 1:1 Low 1:1
Zero Calib 20 4 1 1 ø

NAME EXPERIMENT NO.

J-075 Friday 3-16-90

Woods HAI Range ø To 3ppb
Flow steady @ 2.5, Renewed Chart, Lead Acetate OK
Tygon Dry - Pump & Bubbler O.K
Check 25.4%, up .1%
Optics Steady @ 1450-1450
Zero Calib 24 4 2 1 ø

Woods Met
Operating Normally - Renewed chart - Rebalanced Rain Gage
I.P. Met
Operating Normally - Chart - Batt O.K
50M-4 Met
Operating Normally - Renewed Chart

Fenceline HAI Range ø To 3ppb
Flow Steady @ 4.0, Renewed Chart, Lead Acetate O.K.
Tygon Dry - Pump & Bubbler O.K.
Check 21.6%, up .1%
Optics Steady @ 1650-1650
Zero Calib 28 16 2 1 ø

Gilmore HAI Range ø To 2ppb
Flow Steady @ 3.0, Renewed Chart, Replaced Lead Acetate
Tygon Dry - Pump & Bubbler O.K.
Check Steady @ 25.1%
Optics 1920-1900, down 20 ~, adj to 1900-1900
Range - High 1/1 Low 1/1
Zero Calib 24 6 1 ø
Span Calib - Exp 50 50 50 50
Act 30 39 48 50

50M-4 HAI Range ø To 2ppb
Flow Steady @ 2.5, Replaced chart, Lead Acetate OK
Tygon Dry - Pump & Bubbler OK
Check 15.7%, down .1%
Optics 2170-2180, up 10 ~, adj to 2180-2180
Range - High 1/1 Low 1ppb High, adj for 1/1
Zero Calib 14 1 2 ø ø

50M-4 Colontek - Replaced Cards - No Color change observed

NAME EXPERIMENT NO.

T-078 Monday 3-19-90

Woods-NAI Range Ø to 4ppb
Flow Steady @ 2.5, chart + lead Acetate O.K.
Tygon Dry - Pump + Bubbler O.K
Check 24.4%, down 1% - Adj Span Pot ½ Left
Optics 1460-1450, down 10 ~, ~~adj to~~ No adj.
Zero Calib 22 Ø 3 Ø Ø

Woods Met
Operating Normally - Chart O.K
IP Met
Operating Normally - Renewed Chart - Batt O.K. @ 12.0 V
SO4-4 Met
Operating Normally - Chart O.K. - Recalib W.D. - Right on.

Seneline NAI Range Ø to 3ppb
Flow Steady @ 4.0 Replaced Chart - Lead Acetate - O.K
Tygon Dry - Filled Bubbler - Pump O.K
Check 21.8%, up .2%
Optics 1650-1660, up 10 ~, adj to 1660-1660
Zero Calib 95 2 3 1 Ø

Gilman NAI Range Ø to 3 ppb
Flow Steady @ 3.0, chart + lead Acetate O.K
Tygon Dry - Pump + Bubbler OK
Check 25.2%, up .1%
Optics 1890-1910, up 20 ~, adj to 1910-1910
Range - High 1:1 Low 1:1
Zero Calib 24 16 2 Ø Ø

SO4-4 NAI Range Ø to 2ppb
Flow Steady @ 2.5, chart + lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 15.4%, up .2%
Optics 2190-2200, adj to 2200-2200
Range - High 1:1 Low 1:1
Zero Calib 15 4 1 -2 (Zero Pot Fully Right) Ø
Span Calib - Exp 50 50 50 50 50
Act 28 39 47 49 50

NAME EXPERIMENT NO.

J-080 Wednesday 3-21-90

Woods HAI Range ø to 3ppb
Flow Steady @ 2.5, chart & lead Acetate O.K.
Tygon Dry - Pump + Bubbler ~~OK~~ filled
Check Steady @ 24.4%
Optics 1470-1480 up 10 ea, adj to 1480-1480
Range - High Lt Low Lt
Zero Calib 23 9 4 ø
Span Calib - Exp 50 50 50 50
Act 10 42 49 50

Woods Met
Operating Normally - Chart O.K - Zero + span O.K.
I.P. Met
Operation Normally - Chart & BP OK
SOH-4 Met
Operating Normally - Replaced Chart

Fenceline HAI Range ø to 3ppb
Flow Steady @ 4.0, chart + lead Acetate - OK
Tygon Dry - Pump + Bubbler O.K.
Check 21.6%, down .2%
Optics 1670-1680, up 10 ea, adj to 1680-1680
Range - High Lt Low Lt
Zero Calib 67 4 -ø 2 ø

Edman HAI Range ø to 3ppb
Flow Steady @ 3.0, chart + lead Acetate OK
Drained Tygon - Pump + Bubbler OK
Check 25.3%, up .1%
Optics 1910-1940, up 30 ea, adj to 1940-1940
Range - High Lt Low Lt
Zero Calib -ø -ø 4 1 ø

SOH-4 HAI Range ø to 3ppb
Flow adj to 2.5, chart + lead Acetate O.K.
Tygon Dry - Pump + Bubbler O.K.
Check 15.3%, down .1%
Optics 2150-2170, up 20 ea, adj to 2170-2170
Zero Calib 14 5 1 ø ø
Note ~~OP~~ Photocells seem to be deteriorating - will have to replace

NAME EXPERIMENT NO.

J-082 Friday 3-22-90

Woods HAF Range 0 to 3ppb
Flow Steady @ 2.5, Renewed chart, Lead Acetate O.K.
Tygon Dry - Pump + Bubbler O.K
Check 24.3%, down .1%
Optics 1480-1460, down 20 ea, adj: to 1460-1460
Zero Calib 21 4 1 1 0

Woods Met
Inoperative - Some Data loss - Combination of chart Drive and Power Supply - Exchanged P.S. with T.P. and Adj: DRIVE - OK Now

T.P. Met
Operating Normally - chart + Battery OK

SOH-4 Met

Fairchild HAF Range 0 to 3ppb
Flow Steady @ 4.0, Renewed Chart, Lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 21.7%, up .1%
Optics Steady @ 1690-1690
Range - High 1:1 Low 1:1
Zero Calib 97 8 1 1 (Zero Pot Front Left) 0
Span Calib - Exp 50 50 50 50
Act 21 30 46 50

Gilman HAI Range 0 to 1ppb
Flow Steady @ 3.0, Renewed Chart, Lead Acetate O.K
Drained Tygon - Pump + Bubbler OK
Check Steady @ 23.3%
Optics Steady @ 1940-1940
Zero Calib 22 6 2 1 0

SOH-4 Met Range 0 To 3ppb
Flow Steady @ 2.5, Renewed chart, Lead Acetate OK
Tygon Dry - Pump + Bubbler O.K.
Check 15.4%, up .1%
Optics 2170-2200, up 30 ea, adj: to 2200-2200
Range - High 1:1 Low 1:1
Zero Calib 14 6 2 0 0

NAME EXPERIMENT NO.

J-085 Monday 3-26-90

Woods HAI Range Ø to 3ppb
Flow steady @ 2.5, chart O.K., Replaced lead Acetate
Drained Tygon - Filled Bubbler - Pump O.K.
Check 24.2%, down .1%
Optics 1460-1470, up 10 a, adj: to 1470-1470
Range - High 1:1 Low 1:1
Zero Calib 22 8 3 Ø Ø

Woods Met
Chart Recorder drive intermittent - lost some Data - Made field Repair, but motor must be replaced.

T.P. Met
operating Normally - Replaced Batt, Renewed Chart

SON-4 Met

Fenceline HAI Range Ø to 3ppb
Flow steady @ 4.0, chart + lead Acetate OK
Tygon Dry - Filled Bubbler - Pump OK
Check Steady @ 21.7%
Optics Steady @ 1690-1690
Range - High 1:1 Low 1:1
Zero Calib 88 9 3 1 Ø

Gilman HAI Range Ø to 3ppb
Flow Steady @ 3.0, Replaced Chart - Replaced lead Acetate
DRained Tygon - Pump & Bubbler O.K
Check 23.5%, up .2%
Optics Steady @ 1940-1940
Zero Calib 23 8 1 Ø Ø
Span Calib - Exp 50 50 50 50 (Span Pot Rheost) 50
Act 34 46 50 51 50

SON-4 HAI Range Ø to 3ppb
Flow Steady @ 2.5, ~~Rec~~ Chart O.K., Replaced lead Acetate
Tygon Dry - Pump & Bubbler OK
Check 15.7%, up .3%
Optics 2000, 1980, down 20 a, adj: to 1980-1980
Range - High 1:1 Low 1:1
Zero Calib 15 40 2 1 Ø

NAME EXPERIMENT NO.

J-087 Wednesday 3-28-90

Woods HAI Range ∅ To 2ppb
Flow Steady @ 2.5, chart + lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check 24.3%, up .1%
Optics 1470-1480, up 10 ∼, adj to 1480-1480
Zero Calib 22 & ∅ -1 ∅

Woods Met
Chart Drive Motor failed - Lost Date - Replaced Motor on-site.
Tested O.K. - Chart + Rain Gage OK.

T.P. Met
Operating Normally - chart + Batt O.K.

SO4-4 Met
Operating Normally - chart O.K

Fourdrinier HAI Range ∅ To 3ppb
Flow Steady @ 4.0, chart OK Replaced lead Acetate
Tygon Dry - Pump + Bubbler O.K.
Check Steady @ 21.7%
Optics 1690-1710, up 20 ∼, adj to 1710-1710
Zero Calib 90 & 9 1 ∅

Gilman HAI Range ∅ To 2ppb
Flow steady @ 3.0, chart + lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check 23.6%, up .1%
Optics 1940-1970, up 30 ∼, adj to 1970-1970
Zero Calib 22 & ∅ -1 -∅ (Zero Trim Adj Right) ∅

SO4-4 HAI Range ∅ To 1ppb
Flow Steady @ 2.5, chart + Lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check 15.6%, down .1%
Optics Steady @ 1990-1970
Range - High 1:1 Low 1:1
Zero Calib 16 2 1 ∅
Span Calib - Exp 50 50 50 50 } No adj.
Act 34 47 49 50

NAME

J-089 Friday 3-30-90

Woods HAF — Range ø to 2ppb
Flow steady @ 2.5, Renewed Chart, Lead Acetate O.K.
Tygon Day - Pump + Bubbler O.K.
Check 24.4%, up .1%
Optics steady @ 1480-1480
Range- High 1:1 Low 1:1
Zero Calib 21 5 -ø (Zero Pot Right) ø
Span Calib - Exp 50 50 50 50 50
Act 25 42 49 49 50

Woods Met
Only a few hours date - Everything checks out O.K. - Replaced Multiplexer - Renewed Chart

I.P. Met
Operating Normally - Chart + Batt O.K.

SOH-4 Met
Operating Normally - Renewed Chart

Ferndine HAF — Range ø To 4ppb
Flow steady @ 4.0, Renewed Chart, Lead Acetate O.K.
Tygon Day - Pump + Bubbler O.K.
Check 3h.6%, down .1% Adj Range Pot To 908 from 918
Optics 1720-1760, up 40 counts, adj to 1760-1760
Zero Calib 1 3 2 (Zero Pot Left) 1 ø

Elkman HAF — Rang ø To 1ppb
Flow Steady @ 3.0, Renewed chart - Lead Acetate O.K.
Tygon Day - Pump + Bubbler O.K.
Check 23.4%, down .2% - adj Zero Pot Right
Optics 1980-1960, down 20 counts, adj to 1960-1960
Range- High 1:1 Low 1:1
Zero Calib 21 ø 1 2 ø

SOHH HAF — Range ø to 2ppb
Flow Steady @ 2.5, Renewed chart - Lead Acetate O.K.
Drained Tygon - Pump + Bubbler O.K.
Check 15.2%, down .4%
Optics 2010-2050, up 40 counts, adj to 2050-2050
Range- High 1:1 Low 1:1
Zero Calib 15 4 ø ø

DAILY AVERAGE, MAXIMUM AND TOTAL H2S READINGS

March 1 To March 31, 1990

	Fenceline			Schroeders			Gilman			Woods		
Date	Avg	Max	Total	Avg	Max	Total	Avg	Max	Total	Avg	Max	Total
0301	2	3	57	1	2	27	2	3	41	2	3	46
0302	1	2	33	1	2	25	2	3	37	1	3	33
0303	1	2	31	0	1	10	1	2	28	1	2	33
0304	-	-	-	1	1	17	1	2	16	1	2	23
0305	-	-	-	1	2	31	1	2	14	1	3	27
0306	1	2	21	1	2	29	1	2	19	1	2	23
0307	1	2	23	1	4	35	1	2	18	1	2	21
0308	1	2	29	1	3	22	1	2	19	1	2	24
0309	2	2	36	1	2	24	1	2	18	1	1	15
0310	1	2	34	1	2	23	1	2	25	1	2	13
0311	2	2	39	1	2	22	1	2	22	0	1	8
0312	1	3	15	1	3	17	1	2	25	1	2	17
0313	-	-	-	1	2	15	1	3	26	2	3	36
0314	1	2	23	1	2	12	1	3	23	2	3	37
0315	1	3	31	1	2	20	1	3	28	2	3	37
0316	1	3	29	1	2	26	1	2	26	2	3	43
0317	1	3	30	1	3	21	1	2	23	2	4	43
0318	2	2	38	1	2	22	1	2	21	2	3	42
0319	2	3	39	1	2	24	1	2	25	2	4	47
0320	1	2	32	2	3	39	1	3	27	2	3	39
0321	1	3	35	1	2	32	1	3	30	2	3	37
0322	2	3	39	2	3	43	2	3	36	1	2	32
0323	1	3	34	1	2	25	1	3	32	1	3	31
0324	2	3	40	1	2	22	1	2	24	1	3	34
0325	2	2	37	1	2	28	1	3	22	2	3	38
0326	1	2	23	1	2	23	1	3	18	1	2	16
0327	1	2	30	1	2	16	1	2	31	1	2	18
0328	1	2	27	1	1	17	1	2	23	1	2	16
0329	2	3	46	1	2	30	1	3	24	1	2	16
0330	2	4	49	1	2	33	1	2	23	1	2	24
0331	1	3	33	1	2	21	1	2	18	1	3	27
	1	4	933	1	4	751	1	3	762	1	4	896

All readings are in parts per billion (ppb)

H2S CHART REDUCTION -- SOH-4 Station

From 3-1-90 to 3-31-90

HOUR:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max	Total
0301	1	1	0	1	1	0	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	2	2	2	1	2	27
0302	2	1	1	1	1	0	0	0	1	2	2	1	1	1	1	1	1		2	1	1	1	1	1	1	2	25
0303	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	1	0	0	0	1	0	0	1	0	1	10
0304	0	0	1	0	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	1	1	1	1	1	1	1	17
0305	1	2	1	1	1	1	1	1	1	2	1	‡	2	2	1	2	1	2	2	2	1	1	1	1	1	2	31
0306	1	1	1	1	1	1	1	2	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	29
0307	1	1	0	1	1	1	2	2	2	1	2	1	2	1	2	4	2	1	1	1	1	1	2	2	1	4	35
0308	1	1	2	3	2	3	1	1	0	1	0	0	1	1	0	0	1	1	0	1	0	0	1	1	1	3	22
0309	0	1	1	0	0	0	1	1	1	2	2	‡	1	1	2	0	2	1	2	1	2	2	1	0	1	2	24
0310	1	0	1	1	1	1	1	1	2	1	1	0	1	1	0	1	2	1	2	1	1	0	1	1	1	2	23
0311	1	1	1	2	0		1	0	1	1	1	2	2	1	2	2	1	0	0	0	0	0	1	1	1	2	22
0312	2	1	0	2	1	1	0	0	1	0	1	0	0	0	0	0	0	0	1	1	2	3	1	0	1	3	17
0313	1	0	1	1	0	0	0	1	0	2	1	1	1	1	1	1	0	0	1	0	0	1	0	1	1	2	15
0314	1	1	0	0	0	0	0	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	2	12
0315	1	1	1	1	1	1	0	1	1	1	1	1	1	1		0	2	1	1	1	1	0	0	1	1	2	20
0316	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	1	1	1	1	1	0	1	1	1	2	26
0317	1	1	1	1	1	1	0	1	3	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	3	21
0318	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	2	1	1	1	1	0	1	2	22
0319	0	1	1	1	1	1	1	0	1	0	‡	1	1	1	2	1	1	1	1	1	1	2	2		1	2	24
0320	3	2	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	1	2	2	3	39
0321	1	2	1	2	2	2	1	2	1	1	2	1	1	2	1	2	1	1	1	0	1	1	1	2	1	2	32
0322	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	1	0	1	1	1	2	3	43
0323	1	1	1	2	1	1	1	1	1	2	1	1	1	1	1	1	0	0	1	1	1	2	1	1	1	2	25
0324	1	1	1	0	0	0	1	1	2	2	1	1	2	2	1	1	0	0	1	0	1	1	1	1	1	2	22
0325	1	0	1	1	1	1	2	1	2	2	2	2	2	1	1	0	0	1	1	1	1	1	2	1	1	2	28
0326	1	1	1	1	1	1	2	2	2	2	2	1	1	1	0	0	1	0	0	0	1	1	1	0	1	2	23
0327	0	1	1	1	0	0	1	1	2	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	1	2	16
0328	1	1	1	1	1	1	0	0	1	0	1	‡	1	1	1	1	1	0	0	0	1	1	1	1	1	1	17
0329	1	1	1	0	1	1	0	1	1	2	2	1	1	2	2	2	2	2	2	1	1	2	1	0	1	2	30
0330	1	2	2	2	2	1	1	2	2	1	1	2	2	1	1	1	1	1	1	0	1	2	1	2	1	2	33
0331	1	1	0	1	1	2	1	2	1	1	1	1	0	0	0	0	1	0	1	1	1	2	1	1	1	2	21
																											751
AVG.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
MAX.	3	2	2	3	2	3	2	2	3	2	2	3	2	2	2	4	2	2	2	2	2	3	2	2		4	

‡‡=Power or Equip. failure: ‡=Calibration

Synopsis of Average Daily Meterological Station Readings

03/1989

	T. P. MET					WOODS MET						
DAY	TEMP	WD	WS	RAIN	RH	TEMP	WD	WS	RAD	RAIN	RH	SIGMA
01	16.9	320	9.8	2.51	-	16.9	307	7.9	10	2.87	-	47.9
02	17.3	342	11.0	0.36	-	19.1	332	6.7	162	0.29	-	51.8
03	17.9	13	7.1	0.39	-	19.5	8	4.7	124	0.44	-	41.8
04	18.7	19	7.8	0.04	-	20.3	13	5.2	100	0.01	-	39.7
05	18.9	338	5.7	0.37	-	18.9	329	3.3	56	0.37	-	28.2
06	21.0	5	8.3	0.33	-	20.5	355	4.2	110	0.37	-	31.8
07	20.6	22	8.3	0.44	-	20.2	306	4.3	78	0.45	-	42.7
08	20.5	39	9.5	0.27	-	20.0	295	4.8	64	0.10	-	31.2
09	20.0	20	7.8	0.02	-	20.4	284	3.4	68	0.03	-	17.8
10	20.1	55	10.1	0.43	-	20.6	307	5.2	108	0.13	-	15.9
11	20.5	56	9.7	0.08	-	21.1	318	4.3	128	0.01	-	10.8
12	20.6	26	7.4	0.07	-	20.7	335	3.1	114	0.05	-	11.9
13	21.0	29	6.8	0.07	-	20.7	308	3.6	164	0.14	-	17.5
14	20.5	24	5.3	0.01	-	20.1	277	3.4	200	0.00	-	19.1
15	19.2	318	6.8	0.34	-	18.7	297	5.0	146	0.25	-	20.9
16	18.9	331	7.1	0.07	-	19.6	358	5.5	186	0.04	-	33.4
17	19.8	330	6.3	0.00	-	19.9	289	4.0	220	0.00	-	23.3
18	20.5	9	6.7	0.00	-	20.4	271	3.2	188	0.00	-	41.4
19	20.0	28	5.8	0.02	-	19.9	288	4.2	166	0.04	-	31.8
20	21.0	31	5.9	0.01	-	21.3	317	4.3	186	0.00	-	36.7
21	20.7	52	5.8	0.00	-	21.5	1	5.4	202	0.00	-	31.0
22	21.2	34	5.3	0.00	-	22.0	342	3.9	204	0.00	-	27.0
23	20.7	7	5.1	0.00	-	22.8	350	3.3	158	0.00	-	26.8
24	20.9	18	7.1	0.00	-	-	-	-	-	-	-	-
25	21.2	54	6.6	0.04	-	-	-	-	-	-	-	-
26	21.6	351	4.8	0.27	-	21.5	353	3.2	78	0.00	-	32.1
27	21.0	355	5.5	0.00	-	21.1	336	3.6	160	0.00	-	20.6
28	20.6	358	6.3	0.24	-	21.9	334	3.0	124	0.00	-	35.4
29	19.6	12	8.0	0.05	-	20.8	50	6.7	142	0.01	-	15.5
30	18.9	340	8.0	0.02	-	20.2	16	5.0	170	0.10	-	20.5
31	19.1	360	7.0	0.12	-	20.3	32	4.5	174	0.42	-	15.9
AVG	20.0	11	7.2	0.21	0	20.4	330	4.4	138	0.21	0	28.3
MAX	21.6	-	11.0	2.51		22.8	-	7.9	220	2.87		51.8
MIN	16.9	-	4.8	0.00	1000	16.9	-	3.0	10	0.00	1000	10.8
TOT				6.57					3990	6.12		

Meteorology Station Log
Natural Energy Labs
3-1-90 to 3-31-90

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0301		0302		0303		0304	
0000	175	2	325	8	350	5	325	2
0100	175	2	330	7	340	5	330	3
0200	175	2	330	7	360	5	340	4
0300	275	3	335	8	15	4	345	4
0400	315	5	320	7	315	5	350	5
0500	300	4	320	8	300	4	350	5
0600	295	7	310	9	5	3	335	4
0700	285	8	310	9	5	3	340	4
0800	310	9	300	6	10	5	360	6
0900	310	10	305	7	30	8	360	5
1000	310	10	315	8	35	8	355	4
1100	310	9	335	9	40	7	15	6
1200	315	9	360	10	10	6	25	6
1300	330	8	360	10	360	7	25	6
1400	330	5	10	9	340	7	25	5
1500	360	4	20	9	355	6	20	5
1600	45	3	15	9	350	7	30	4
1700	310	3	15	9	330	4	20	4
1800	300	2	15	9	320	3	360	3
1900	280	2	10	8	320	2	320	2
2000	290	5	10	6	330	2	315	3
2100	335	4	330	5	315	2	315	3
2200	315	4	325	5	315	2	310	3
2300	325	8	360	6	325	2	300	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0305		0306		0307		0308	
0000	320	2	285	2	360	3	20	5
0100	315	2	275	2	330	3	20	4
0200	305	2	270	2	320	3	25	4
0300	310	3	290	3	315	3	15	4
0400	295	3	290	3	310	5	15	5
0500	300	3	300	2	320	4	15	5
0600	305	4	300	3	320	3	20	7
0700	310	4	295	4	330	3	20	5
0800	320	3	305	5	330	3	25	5
0900	340	6	320	4	350	4	20	6
1000	350	6	10	4	360	6	25	6
1100	350	5	20	4	360	6	35	7
1200	360	5	40	4	5	6	35	7
1300	355	6	40	5	360	6	25	6
1400	360	6	50	5	350	5	30	6
1500	15	5	70	6	340	5	40	8
1600	360	4	55	6	10	7	45	8
1700	350	3	75	5	10	8	50	8
1800	350	3	35	4	360	6	25	5
1900	350	4	20	3	15	7	360	4
2000	310	2	40	4	15	6	10	2
2100	310	2	60	6	350	5	360	2
2200	305	2	65	3	360	6	360	2
2300	285	2	330	2	10	6	310	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0309		0310		0311		0312	
0000	310	2	210	2	60	4	45	3
0100	305	2	165	2	80	4	310	2
0200	310	2	105	2	85	4	315	2
0300	295	2	105	2	55	3	330	2
0400	295	2	105	2	75	3	320	3
0500	295	2	80	2	110	2	320	3
0600	300	2	60	2	45	2	315	2
0700	310	2	60	2	70	3	360	3
0800	360	3	55	2	40	3	320	4
0900	40	4	60	2	35	3	30	5
1000	50	5	45	3	40	3	30	6
1100	60	6	70	4	45	3	40	7
1200	60	6	80	5	50	5	40	6
1300	55	5	90	6	45	5	45	6
1400	50	5	120	7	50	6	35	6
1500	55	5	90	7	60	5	40	7
1600	60	3	85	6	55	5	45	7
1700	65	2	85	5	45	5	35	5
1800	340	2	90	5	30	5	35	4
1900	315	2	75	5	360	3	10	3
2000	290	2	85	4	360	3	320	2
2100	210	2	80	3	350	2	325	2
2200	210	2	110	5	325	3	60	2
2300	210	2	60	3	50	3	60	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0313		0314		0315		0316	
0000	10	2	35	2	130	2	315	6
0100	300	2	35	2	130	2	310	5
0200	290	2	35	2	130	2	305	5
0300	290	2	45	2	130	2	295	3
0400	290	2	50	2	130	2	295	2
0500	285	2	50	2	130	2	290	2
0600	280	2	55	2	130	2	295	4
0700	280	2	55	2	130	2	290	3
0800	15	3	310	2	250	3	290	5
0900	50	6	125	3	315	4	300	6
1000	90	6	115	5	325	6	310	9
1100	120	6	110	5	360	8	315	8
1200	95	6	110	5	10	9	340	8
1300	115	6	130	7	360	10	345	8
1400	80	5	130	7	15	10	350	8
1500	65	4	135	7	15	11	345	7
1600	55	3	140	6	360	10	340	8
1700	45	2	130	5	330	10	330	7
1800	40	2	125	3	330	10	320	6
1900	40	2	125	2	315	9	310	4
2000	35	2	130	2	310	7	300	4
2100	35	2	130	2	300	6	290	3
2200	35	2	130	2	300	5	290	3
2300	35	2	130	2	315	6	285	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0317		0318		0319		0320	
0000	290	2	290	2	15	2	175	2
0100	310	3	290	2	15	2	170	3
0200	285	2	290	2	15	2	170	2
0300	285	2	290	2	15	2	155	3
0400	280	3	290	2	15	2	175	3
0500	285	2	290	2	15	2	180	2
0600	280	2	290	2	15	2	185	2
0700	280	2	290	2	15	2	190	2
0800	280	2	290	2	15	2	160	3
0900	280	2	290	2	85	3	145	5
1000	285	3	305	3	145	3	165	6
1100	325	6	335	4	135	4	170	7
1200	335	8	335	4	130	7	160	8
1300	335	8	25	5	135	7	160	7
1400	340	7	40	7	130	7	170	6
1500	350	8	50	6	140	6	170	6
1600	350	7	55	5	150	5	155	4
1700	340	7	60	4	135	4	150	3
1800	330	6	25	3	160	3	150	2
1900	325	5	10	2	190	2	150	2
2000	315	3	15	2	185	2	150	2
2100	325	2	15	2	185	2	150	2
2200	320	2	15	2	200	2	155	2
2300	290	2	15	2	190	2	155	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0321		0322		0323		0324	
0000	155	2	115	2	15	2	110	2
0100	160	2	115	2	15	2	110	2
0200	160	2	115	2	15	2	115	2
0300	160	2	115	2	15	2	115	2
0400	160	2	115	2	15	2	125	2
0500	160	2	115	2	15	2	130	2
0600	160	2	120	2	15	2	135	2
0700	135	2	120	2	310	3	135	2
0800	115	3	125	3	290	4	90	3
0900	115	4	130	3	315	5	40	3
1000	110	4	135	5	10	4	35	5
1100	135	5	130	6	15	5	50	5
1200	145	7	130	7	35	5	60	6
1300	130	7	130	7	110	6	85	6
1400	135	6	125	6	135	7	90	5
1500	125	6	100	5	95	6	110	6
1600	130	7	90	5	85	4	120	5
1700	115	4	90	3	45	3	100	4
1800	105	3	40	3	100	2	65	3
1900	110	2	25	2	100	2	75	2
2000	110	2	25	2	100	20	85	2
2100	115	2	20	2	100	2	90	2
2200	115	2	15	2	105	2	90	2
2300	115	2	15	2	105	2	90	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0325		0326		0327		0328	
0000	95	2	290	2	285	2	360	2
0100	95	2	290	2	285	3	360	2
0200	95	2	290	2	290	3	360	2
0300	95	2	290	2	300	3	285	2
0400	95	2	285	2	295	3	290	3
0500	95	2	290	2	290	3	275	3
0600	170	2	290	2	285	3	265	2
0700	210	3	290	3	280	4	265	2
0800	135	3	305	3	315	5	275	4
0900	120	4	315	3	340	6	320	5
1000	125	5	345	4	360	6	350	6
1100	135	6	15	5	360	6	345	6
1200	140	7	25	5	10	6	345	6
1300	135	6	20	7	35	7	345	6
1400	135	5	20	6	25	6	350	8
1500	130	5	10	6	20	6	350	8
1600	95	3	15	6	10	6	355	7
1700	50	3	360	6	10	6	345	8
1800	55	2	360	5	350	4	335	8
1900	75	2	310	3	315	3	325	6
2000	70	3	295	3	315	3	310	5
2100	60	2	300	3	310	3	320	5
2200	290	2	290	3	315	4	340	6
2300	290	2	290	4	310	3	350	7

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0329		0330		0331			
0000	350	7	310	5	290	3		
0100	350	6	300	6	285	3		
0200	355	6	310	5	280	2		
0300	340	5	295	5	315	3		
0400	330	7	305	5	310	4		
0500	320	5	295	5	295	5		
0600	310	5	295	6	300	4		
0700	300	4	300	5	295	3		
0800	300	5	310	5	315	3		
0900	310	6	315	7	335	5		
1000	340	6	360	10	360	7		
1100	350	7	360	10	20	8		
1200	350	8	15	9	30	7		
1300	340	9	15	1	35	7		
1400	340	9	20	10	40	7		
1500	340	10	10	12	40	8		
1600	335	10	360	10	25	8		
1700	335	9	355	9	25	7		
1800	335	8	330	8	10	6		
1900	325	8	315	6	350	6		
2000	325	7	305	5	340	5		
2100	325	7	295	6	320	4		
2200	325	7	290	5	310	3		
2300	320	6	300	4	300	3		